

A STUDY OF A GYNANDROMORPH OF *MELANO-
PLUS MEXICANUS MEXICANUS* (SAUSS.)
(ORTHOPTERA)¹

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Gynandromorphs have been reported as occurring quite frequently in some orders of insects, while in other orders this condition has not been reported at all or only occasionally. The scarcity of reports of gynandromorphs in some orders may, however, be due to the fact that sexual differences in these orders are not striking and, therefore, the gynandromorphs, if they occur, are not readily detected, or it may be due to the fact that the members of these orders are less frequently collected and less critically studied.

The order, Lepidoptera, has furnished about 1000 cases of gynandromorphs, or more than any other order of insects or other group of animals. Since *Drosophila melanogaster* Meig. has been so extensively used in genetical studies and since untold thousands of these flies (hybrids and non-hybrids) have been minutely examined in these studies, it is not surprising to find that more gynandromorphs have been found in this species of animal than in any other. T. H. Morgan (4) in discussing the frequency of occurrence of gynandromorphs in *Drosophila melanogaster* Meig. stated that the observed ratio was 1 gynandromorph in 2200 flies, but it should be remembered that this ratio is based largely upon data gathered from hybrid flies. Folsom (3) writes that Speyer estimated that in Lepidoptera only one individual in thirty thousand is hermaphroditic.

Dr. H. Hagen in 1861 (1) reviewed the literature dealing with insect gynandromorphs and while he makes no claim that his investigations cover the field completely, he listed 119 reported cases of gynandromorphs. He added, however, that some of these reported cases were not true gynandromorphs, but de-

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formed individuals. Of the 119 cases listed, 99 were Lepidoptera, 15 were Hymenoptera, 3 were Coleoptera, 1 was a Dipteran and 1 an Orthopteran. The Orthopteran listed was a specimen of *Acridium dispar* Bris = (*Chrysochraon dispar* Germ) reported in 1848 by Brisant de Barnville.

In 1889 Ph. Berthau (2) published a paper in which he stated that there were 225 known cases of hermaphroditic insects. These were grouped as follows: 255 Lepidoptera, 51 Hymenoptera, 9 Coleoptera, 8 Diptera, and 2 Orthoptera.

In October 1941 L. C. Paul (5) published a paper in the Canadian Entomologist in which he described and excellently figured a gynandromorphic specimen of *Camnula pellucida* Scudder. While gynandromorphism is now recognized as not being as rare as it was once believed to occur, we still do not know its frequency of occurrence in various groups of animals that were produced in the out-of-doors, free from the control of man.

SECONDARY SEXUAL DIFFERENCES BETWEEN MALE AND
FEMALE SPECIMENS OF *MELANOPLUS M.*
MEXICANUS (SAUSS.)

The characters that are ordinarily used to distinguish male from female specimens of *Melanoplus m. mexicanus* (Sauss.) are those of the external genitalia and the abdominal segments and structures associated with the genitalia. There are other characters, however, that are limited to one or the other sex. These characters may be briefly described as follows:

- A. Lateral carinae of fastigium prominent in males, less so in females. Fastigial depression deeper in males than in females. Interocular space narrower in males than in females. Antennae longer in males than in females.
- B. Space between mesosternal lobes into which a tongue of the metasternum dovetails, wider in females than in males. Space between metasternal lobes into which a tongue of the first abdominal sternum dovetails wider in females than in males.
- C. Tubercle on mesosternum prominent in males; absent in females.
- D. First and second pair of legs: In the male, the femora and tibiae are considerably heavier than they are in the female.

The distal segment of the tarsus is heavier and longer in the male than it is in the female. The tarsal claws (ungues) and the arolia are heavier and larger in the male than they are in the female.

- E. Third pair of legs: The most evident differences between the third pair of legs of the male and female are to be found in the last tarsal segment, the tarsal claws and the arolium. These differences are like those already described for the first and second pair of legs.

DESCRIPTION OF GYNANDROMORPH SPECIMEN OF *M. M.*
MEXICANUS (SAUSS.)

The specimen was collected by the writer near Miller, in Hand County, South Dakota, August 13, 1939.

The gynandromorph is typically male in structure in the dorsal half of the body and in the left half of the ventral half of the body. In the ventral right half of the body the gynandromorph is typically female in structure except for a few details that will be pointed out hereafter.

The head characters, with the exception of the antennæ (see paragraph A. under Secondary Sexual Differences) are typically male. The left antenna is like that of a male, while the right antenna is shorter, like that of a female.

The space between the mesosternal lobes (see paragraph B) is typically like that of the female on its right portion and like that of the male on its left. The same is true of the space between the metasternal lobes. In other words these spaces are not bilaterally symmetrical.

The tubercle (see paragraph C) is only found on the right side of the mesosternum and is reduced in size. It is absent on the left side.

The three legs of the left side of the body are typically male in structure, while those of the right side of the body are typically female (see paragraphs D and E).

The dorsal half of the abdomen is typically male in structure, including all of the terga, the supra-anal plate, the paraprocts, the furcula and the cerci. The ventral half of the left side of the abdomen is also typically male, including the sterna and the

subgenital plate. The ventral half of the right side of the abdomen is typically female except for certain characters at the posterior end. Only one valve of an ovipositor is present and that happens to be the lower right valve. Posterior and dorsal to this valve are two sclerites which appear to be a distorted half of a ninth male sternum and a distorted half of a male subgenital plate. Other distortions present in the abdominal sterna can be readily seen by studying Figure 3.

The specimen was not dissected to study the gonads, ducts, glands, etc.

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PLATE X

Gynandromorph of *Melanoplus m. mexicanus* (Sauss.)

1. Dorsal view of posterior part of abdomen; 2. lateral aspect of right side of posterior part of abdomen; 3. ventral view of posterior part of abdomen: c, cercus; f, furcula; p, pallium; rv, right ventral valve of ovipositor; sa, supra-anal plate; sg, subgenital plate; ixs, ninth abdominal sternum; xt, tenth tergum.

